

**TAMROCK LOADERS INC.**

**POWER SYSTEM CHECK LIST**

FOR

Safety Component System with a  
Caterpillar 3304NA engine.

**MSHA CERTIFICATION 31 D 53**

Machine Approval(s): 31-56

Items and functions used in this document must be maintained in order for the Safety Component System to be considered permissible. For a complete vehicle permissibility evaluation, this checklist must be used in conjunction with a vehicle permissibility checklist and, if so equipped, an electrical system checklist.

(WEEKLY) WHERE SHOWN ON THE FOLLOWING PAGES DESIGNATES THOSE  
INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY  
MAINTENANCE EXAMINATION IN ACCORDANCE WITH 30 CFR SECTION  
75.1914.

**ALL INSPECTIONS AND TESTS SHALL BE PERFORMED IN FRESH AIR**

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1. ( ) It has been determined that the area in which the tests are to be performed is fresh air.
2. ( ) This machine utilizes a Caterpillar four cylinder Model 3304 PCNA diesel engine.

### INTAKE SYSTEM

Figure 1 shows the assembled intake system.

(WEEKLY) 3. ( ) All components appear to be as shown in Figure 1.

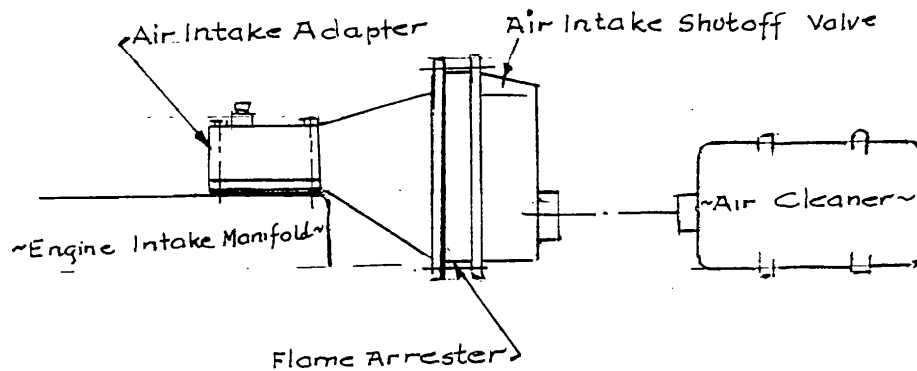


Figure 1. Assembled Intake System

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- (WEEKLY) 4. ( ) A copper gasket is installed between the air intake adapter and the engine as shown in Figure. 2.

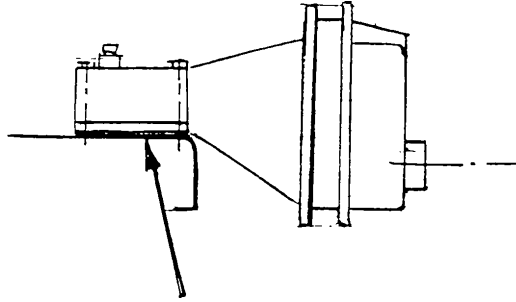


Figure 2. Gasket between Air Intake Adapter and Intake Manifold.

- (WEEKLY) 5. ( ) The fasteners securing the air intake adapter to the engine are in place and tight.
6. ( ) Remove the intake flame arrester. The intake flame arrester is shown in Figure 3. The flame arrester core is clean and has no apparent damage.

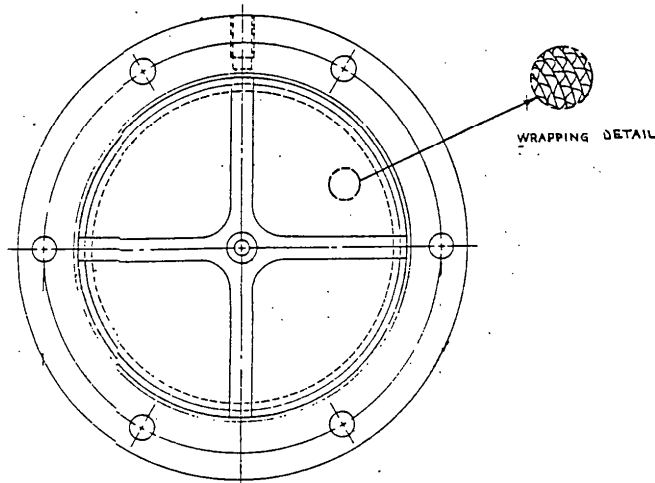


Figure 3. Intake Flame Arrester

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7. ( ) A 0.01 S inch wire gauge cannot pass through the openings of the flame arrester core. The procedure for making this inspection (dated August 5, 1985) is attached.
- (WEEKLY) 8. ( ) A copper gasket is installed between the intake flame arrester and the air intake adapter as shown in Figure 4.

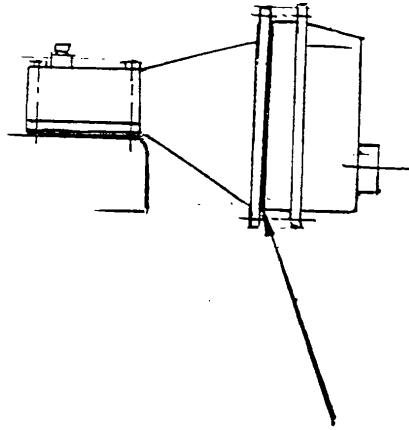


Figure 4. Flame Arrester Gasket

- (WEEKLY) 9. ( ) The fasteners securing the intake air shut-off housing and flame arrester to the air intake adapter are in place and tight,
- (WEEKLY) 10. ( ) The complete intake system has no signs of damage. There are no loose connections, cracks, or missing port plugs (or caps).

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EVALUATION PROCEDURES FOR INSPECTING CRIMPED-RIBBON TYPE  
INTAKE FLAME ARRESTERS ON DIESEL-POWERED EQUIPMENT  
(AUGUST 5, 1985)

1. Remove flame arrester assembly from housing.
2. Place on flat surface with a contrasting background under the flame arrester such as, brattice cloth or a clean white cloth.
3. Adequate lighting is required; cap lamp lighting is not sufficient.
4. Visually inspect each side of flame arrester for openings or spaces, obviously greater than the triangular spaces of the cores. These kinds of openings may have been caused by prying a screwdriver or other such objects against or through the flame arrester core during manufacturing or in mine maintenance. Flame arrester cores with such damage must not be permitted to be used on permissible equipment.
5. Visually inspect each side of the core for pieces where the windings of the flame arrester core appear to be separating such that gaps can be seen. If such gaps exist they must be checked as follows:
  - a. The only measuring tool considered acceptable for performing this evaluation is an 0.018 iron calibrated plug gauge. (Sometimes called a wire gauge.) The plug gauge is to be mounted in a gauge holder (Figure 5) weighing 1 to 1.5 ounce and projecting at least one inch out of the end.



Figure 5

- b. Grasp the gauge holder lightly between the index finger and thumb. Place the wire tip at the point in question; making sure the plug gauge is vertical. Using only the weight of the gauge and holder, see if it will enter the apparent gap. Do not attempt to force or wiggle the gauge through the opening.

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- c. If the plug gauge enters the opening, the flame arrester core must not be used on permissible equipment.
- 6. Visually inspect the triangles in the flame arrester core (both sides) for triangles that appear to be larger than the rest. If such conditions exist, these openings must be checked as previously described in Section 5 a, b, c.
- 7. Finally, if the flame arrester core passes all of the above evaluations, a final check should be performed on at least 5 triangles on each side of the core with the procedure described in Section 5 a, b, c. In performing this check, the tip of the plug gauge must be placed against a specific triangular opening. If this special care is not taken, the evaluation will be invalid.

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## EXHAUST SYSTEM

The exhaust system of the engine includes a water-cooled exhaust manifold, exhaust pipe, a waterbath exhaust conditioner.

- (WEEKLY) 11. ( ) The fasteners securing the exhaust manifold to the engine are in place and tight. The water-cooled exhaust manifold is illustrated in Figure, 6.

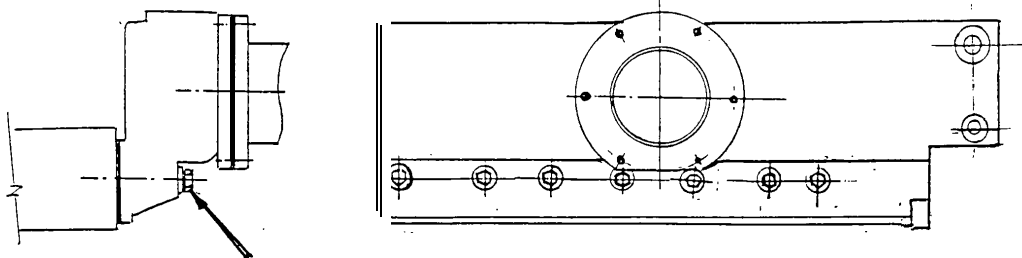


Figure 6. Water-Cooled Exhaust Manifold

- (WEEKLY) 12. ( ) A steel gasket (2 pieces) is installed between the exhaust manifold and the engine head as shown in Figure 7.

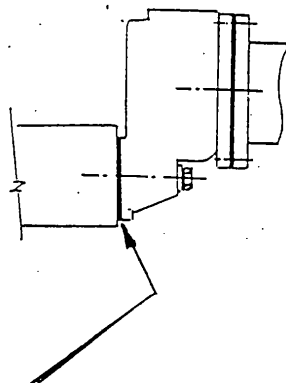


Figure 7. Gasket Between Exhaust Manifold and Engine

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- (WEEKLY) 13. ( ) A copper gasket is installed between the flange of the exhaust pipe and the flange of the exhaust manifold as shown in Figure 8.

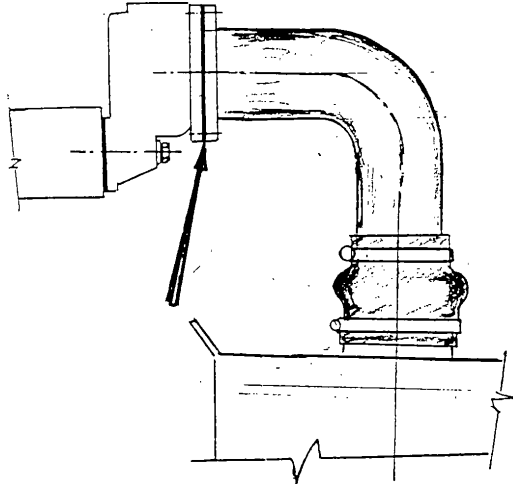
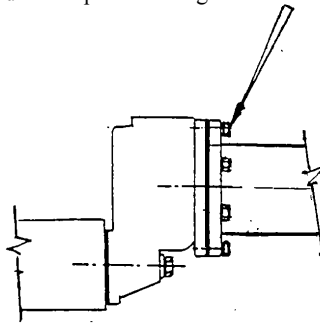


Figure 8. Gasket between Exhaust Pipe and Exhaust Manifold Flange

- (WEEKLY) 14. ( ) Fasteners securing the exhaust pipe to the flange of the exhaust manifold are in place and tight.



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- (WEEKLY) 15. ( ) The Hump Hose connecting the exhaust pipe to the exhaust conditioner has no leaks or cracks and the two hose clamps are in place and tight. See Figure 9.

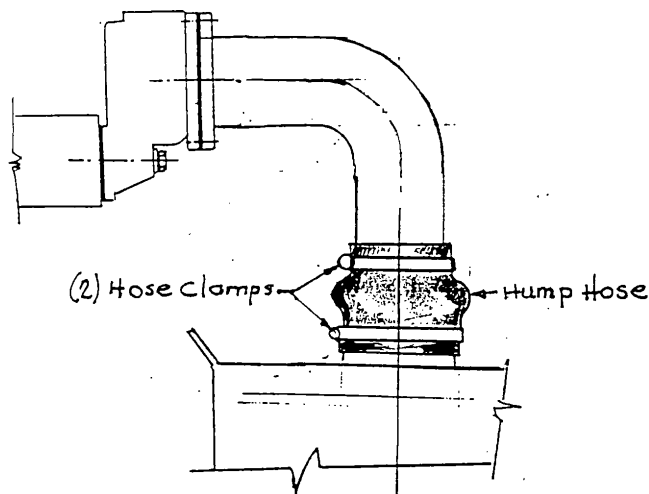


Figure 9. Hose Connection Between Exhaust Pipe  
And the Exhaust Conditioner Inlet

- (WEEKLY) 16. ( ) Check that Exhaust Conditioner is in good condition with no open holes, cracks or missing plugs.

#### **SYSTEM OPERATION**

- (Weekly) 17. ( ) The engine shuts down when the "push to stop engine" button is held in. This stop button is located in the instrument panel in the operator's compartment.
18. ( ) Connect a manometer or magnehelic (vacuum gauge) to the intake vacuum port shown in Figure 10. Run the engine at full throttle with no load, The intake vacuum does not exceed 30 inches of water column.

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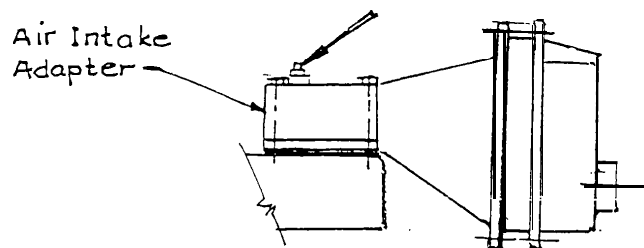


Figure 10. Intake Vacuum Port Location

19. ( ) Remove the manometer or magnehelic and securely reinstall the vacuum port plug.
20. ( ) Connect a manometer or magnehelic to the test port in the exhaust pipe flange. Run the engine at full throttle no load, with exhaust conditioner filled to normal operating water level. The exhaust backpressure does not exceed 34 inches of water.
21. ( ) Shut engine down and remove manometer or magnehelic and securely reinstall test plug.
- (WEEKLY) 22. ( ) With engine running, check the air system for leaks (i.e., hose connections, sensors, air tanks, air tank drain valves, filters, control valves, float valve, etc.) No leaks were found.
23. ( ) The safety/cooling systems include two temperature sensors. One is placed in the engine coolant outlet. The other sensor is mounted in the exhaust manifold shown in Figure 11.

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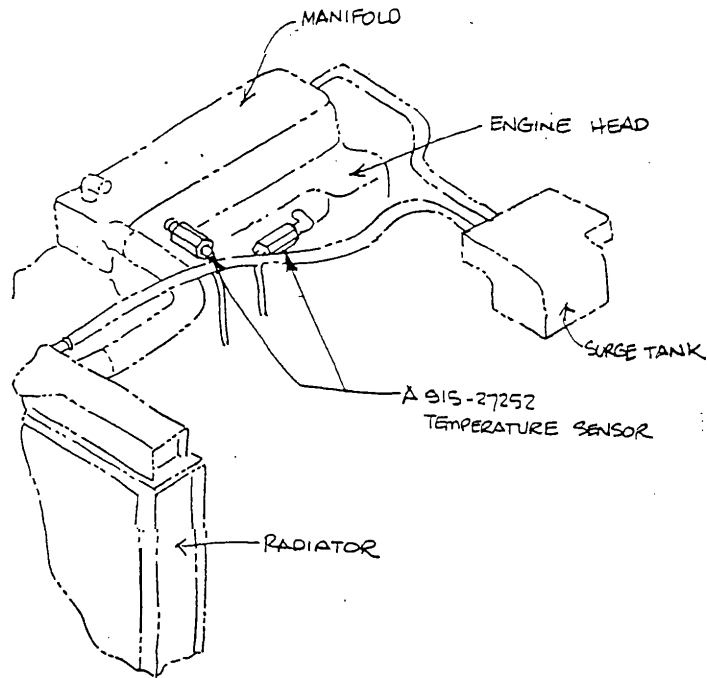


Figure 11. Coolant Temperature Sensor Locations.

Test the temperature sensor valves. Two test methods are offered for information. Either method is acceptable.

METHOD 1.

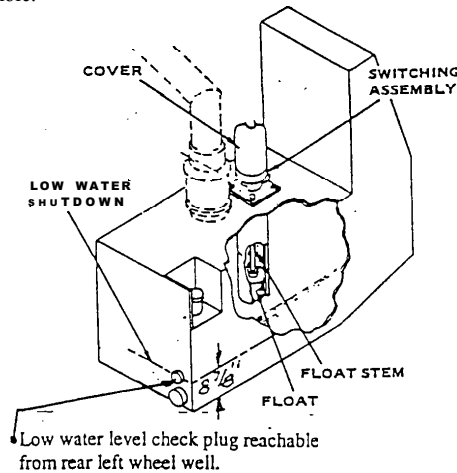
Unscrew the sensor valve and install a pipe plug in its place. Reattach the safety system air hose to the sensor. Start the engine and immerse the end of the temperature sensor valve into heated and agitated water/antifreeze mixture. The sensor must open and

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exhaust the safety system air pressure and shut down the engine before the temperature exceeds 212 degrees F.

METHOD 2.

- a. With engine idling, slowly remove sensor hose venting safety system air pressure. This must cause the engine to shut down.
  - b. Remove sensor and attach to low pressure shop air and test as in Method 1 above. Sensor must vent air before temperature exceeds 212 degrees F.
24. ( ) Both sensors shut engine down before temperature exceeds 212 degrees F.
  25. ( ) The temperature sensors are reinstalled and safety system air hoses are securely attached.
  - (WEEKLY) 26. ( ) Test for proper low water shutdown with engine at medium speed. Remove the check plug. The center of the check plug is located 8 7/8 inches above the bottom of the exhaust conditioner as shown on the illustration below. CAUTION: Conditioner water may be hot! The engine must shut down before water ceases to run from the test plug hole.



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- (WEEKLY) 27. ( ) After the engine has automatically shut down due to exhaust conditioner low water level, try restarting the engine prior to replenishing the exhaust conditioner water. The engine may turn over but must not start. I
- (WEEKLY) 28. ( ) Replace the low water test plug and replenish the exhaust conditioner water.
- (WEEKLY) 29. ( ) Start the engine, operate at low idle and engage the emergency intake air shut-off valve. The valve handle is located in the instrument/control panel in the operator's compartment.
- The air shut-off valve closes immediately and shuts down the engine.
- ( ) Reset the emergency intake air shut-off valve at the valve proper.

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